

REMARKS/ARGUMENTS

Reconsideration of this application is respectfully requested.

The rejection of claims 1-5 under 35 U.S.C. §103 as allegedly being made “obvious” based on Gale ‘616 in view of Ogawa et al. ‘415 is respectfully traversed.

The Examiner admits that the primary Gale ‘616 reference does not teach a hard coat film on an outer peripheral sliding surface of a piston ring. In addition, the Examiner erroneously asserts that Gale et al. ‘616 teaches a piston ring made of cast iron. The undersigned can find no such teaching in Gale et al. ‘616 which is essentially exclusively concerned with disclosing a steel insert ring 12 (having a conventional piston ring groove therewithin) about the periphery of an aluminum piston 10. The only mention the undersigned can find in the entirety of the Gale et al. ‘616 teaching with respect to a piston ring that might be mounted within such a piston ring groove 16 is at column 2, lines 20-22:

“...A circumferential groove is provided in the outer surface of the insert ring to receive a conventional piston ring.”

In an attempt to supply even the admitted deficiencies of Gale, the Examiner relies upon Ogawa for its teaching of a “sliding member” that is provided with a hard deposition layer by means of ion-plating. While this reference does teach the deposition of a hard film on the sliding surface of a piston ring, the reference does not appear to even recognize the “adhesion” problem (i.e., between the groove and the ring) that is being addressed in the presently claimed invention. There is no suggestion in either reference for the combination now being asserted by the

Examiner. Furthermore, even if they are combined, they fail to teach the invention of original claim 1.

Indeed, neither Gale nor Ogawa recognize the “adhesion” problem that is addressed in the present application.

With respect to dependent claims 2-5, the Examiner also erroneously asserts that Gale teaches a piston ring made of cast iron selected from the group consisting of the six different specific types of cast iron specified in some of these claims – and an elastic modulus within the range of elasticity, etc. addressed by some of these claims. So far as the undersigned can ascertain from his study of the Gale reference, there is no such teaching or suggestion anywhere in the Gale reference.

It is respectfully noted that the Examiner has not cited to any particular portion of the Gale teaching as allegedly supporting the allegations of a teaching of a cast iron piston ring – let alone any one or all of the six different specific types of cast iron – nor an elastic modulus ranging from 130000 to 170000 MPa. If the Examiner continues to feel that there is such teaching or suggestion in the Gale reference, then it is respectfully requested that such teaching be specifically pointed out and noted in the next Office Action.

It will also be noted that original claim 1 has now been amended so as to incorporate limitations earlier in dependent claims 2-3 thus making its allowable nature even more readily apparent.

The rejection of claims 1-3 under 35 U.S.C. §103 as allegedly being made “obvious” based on the Ahlen ‘640 reference is also respectfully traversed.

As the Examiner has already recognized, Ahlen is directed to an entirely different problem -- providing a liquid seal between relatively rotating parts. The Ahlen teaching has nothing whatever to do with respect to either recognizing or solving the “adhesion” problem identified in this application as occurring between the ring and ring groove in a reciprocating piston/cylinder environment of an internal combustion engine. Indeed, in the rotatable seal environment of Ahlen ‘640, it is not even clear that a ring sticking within a ring groove would present any particular problem.

Furthermore, with respect to other claimed features (e.g., the specific types of cast iron in claim 2 and the specific range of elastic modulus in claim 3), the undersigned has been unable to find any support whatsoever in Ahlen ‘640. If the Examiner continues to believe that there is support anywhere in Ahlen for such specific recitations, then the Examiner is respectfully requested to specifically point out exactly where in Ahlen ‘640 there is any support for such allegations.

The Examiner’s attention is drawn to new claims 6-11 which depend directly or indirectly from amended claim 1 and are thus believed to be in fully allowable condition for reasons such as those noted above as well as for the additional limitations incorporated in these additional dependent claims.

Attention is also drawn to new independent claim 12 which is drawn to a piston and piston ring assembly adapted for reciprocating movement in a cylinder of an internal combustion

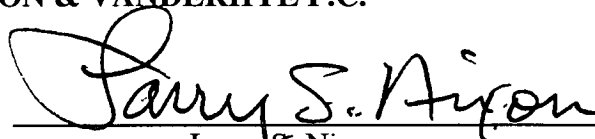
Attention is also directed to new method claim 13 which is directed to an analogous method for reducing the tendency of a piston ring to adhere to a steel piston ring groove in a reciprocating piston of an internal combustion engine. The method requires applying a hard coat film to at least an outer peripheral sliding surface of a cast iron piston ring and then fitting that surface-coated cast iron piston ring into the steel piston ring groove. As already noted, the cited art fails to teach such method – or even to recognize the problem being addressed by such method.

Accordingly, this entire application is now believed to be in allowable condition and a formal Notice to that effect is respectfully solicited.

Respectfully submitted,

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